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NSSDC NATIONAL SPACE SCIENCE DATA CENTER

WORLD DATA CENTER A for ROCKETS AND SATELLITES 86-02

NSSDC and WDC-A-R&S Document Availability and Distribution Services

April 1986

NASA
National Aeronautics and Space Administration

Goddard Space Flight Center

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National Space Science Data Center (NSSDC)/
World Data Center A for Rockets and Satellites (WDC-A-R&S)
National Aeronautics and Space Administration
Goddard Space Flight Center
Greenbelt, Maryland 20771

FOREWORD

The National Space Science Data Center (NSSDC) has been restructured since the last issue of this document. As a consequence of the internal changes that have taken place, some new kinds of documents are now being produced within NSSDC. Specifically, the Data Management Systems Facility, which was recently incorporated within the organizational framework of NSSDC, is producing documents about data management systems and about research related to such systems. The Central Data Services Facility, which assimilated the functions of the original NSSDC, continues to generate documents about satellites and about data from satellite experiments.

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INTRODUCTION

Purpose

This publication describes the documents and general services available from the newly restructured National Space Science Data Center (NSSDC) and the World Data Center A for Rockets and Satellites (WDC-A-R&S). Included are the ordering procedures for documents presently available and the procedures for obtaining future documents.

Background

NSSDC was established by the National Aeronautics and Space Administration (NASA) to further the widest practicable use of reduced data obtained from space science investigations and to provide investigators with an active repository for such data. Since its establishment, NSSDC has been responsible for the active collection, organization, storage, announcement, retrieval, dissemination, and exchange of data received from satellite experiments. Information on sounding rocket investigations has been collected also. In addition, NSSDC has collected some correlative data from ground-based observatories and stations for NASA investigators and for on-site use at NSSDC in the analysis and evaluation of space science experiment results.

Today, NSSDC continues to provide the services that it has always provided, but it is now expanding the scope of its functions and services in order to incorporate rapidly evolving hardware and software technologies that will further promote user access to space science data. NSSDC is developing data archives not only in more advanced off-line forms but also in on-line forms that will be accessible to users from remote terminals.

A summary of the changes occurring within the NSSDC is provided in the following excerpt from an *NSSDC Newsletter* article (Vol. 1, No. 1, April 1985) which was written by the Head of the Central Data Services Facility:

> NSSDC primarily exists to assure continuing accessibility and utility of data produced by NASA spaceflight missions. For most of its nearly 20-year history, data were primarily held off-line in the form of magnetic tapes, microforms, photographic film, and hardcopy. In this off-line environment, NSSDC typically acquired reduced and analyzed data from individual scientists, archived these data, retrieved data in response to requests with the aid of an automated information system, duplicated tapes or film, and mailed data along with a documentation package to requesters.

We have entered an era when data will be held and transmitted in both off-line and on-line forms. For off-line data, NSSDC is beginning to move to higher density storage media, optical disks for digital data, and videodisks for analog images. With respect to on-line data and electronic data communications, NSSDC is bringing some of its archive on-line to allow access from remote terminals. Moreover, since NSSDC is managing the DECnet-based Space Plasma Analysis Network (SPAN), some users will have computer-to-computer access to on-line data. NSSDC has recently assumed the role of providing a central Directory/Catalog service, whereby users can determine characteristics of data possibly relevant to their current needs, including data location and access procedures. Data described may be held on-line or off, at NSSDC or elsewhere.

In addition to these activities oriented toward data accessibility, NSSDC pursues other activities. For instance, NSSDC personnel have developed systems to facilitate the use of data, including the Coordinated Data Analysis Workshop (CDAW) and Pilot Climate Data System (PCDS) software packages. Value-added data sets have been created by appropriately synthesizing various data sets. Solar-wind magnetic field and plasma compilations and models of geomagnetically trapped energetic particles are notable examples.

In the past, NSSDC has been responsible for archiving and disseminating data from all NASA scientific missions, across the full range of space and Earth sciences, with the exception of Landsat data. Recent recommendations from NASA advisory groups, particularly the Committee on Data Management and Computation (CODMAC) of the National Academy of Sciences, have stressed the merit of a distributed data archiving system. For instance, Space Telescope data are to be archived and disseminated by the Space Telescope Science Institute in Baltimore. The details of the implementation of the CODMAC recommendations remain to be determined. However, it is likely that NSSDC will be the principal archive in some disciplines; may do long-term archiving in most disciplines; will provide the central Directory for the whole system; and will provide overall leadership in the development and implementation of the hardware, software, and communications approaches needed for effective data management in this distributed environment.

To provide remote electronic accessibility to its information files, NSSDC is developing several on-line database systems containing information about specialized data sets: (1) the Central On-Line Data Directory (CODD) as a high-level, multi-discipline entity; (2) the Pilot Climate Data System (PCDS) for climate-related data; (3) the Pilot Land Data System (PLDS) for land science data; and (4) the Crustal Dynamics Data Information System (CD/DIS) for geodetic and crustal dynamics data. In addition, the Coordinated Data Analysis Workshop (CDAW) system provides ready access to and manipulation and display of data contained in several databases constructed for the

study of specially selected events. To date, all such CDAW databases have been in the solar-terrestrial/magnetospheric physics discipline. To promote the most rapid exchange of and access to data, NSSDC is availing itself of networking technology: NSSDC is a node on the Space Physics Analysis Network (SPAN) for which the address is NSSDC::REQUEST.

In order to augment NSSDC facilities for data management, NSSDC has been resituated within the Goddard Space Flight Center's organizational framework. NSSDC is now one of the principal Centers within the Space Data and Computing Division of the Space and Earth Sciences Directorate at Goddard Space Flight Center (See Figure 1). (The other Centers are the NASA Space and Earth Sciences Computing Center and the Goddard Image and Information Center.) Internally, NSSDC consists of the Central Data Services Facility (CDSF) and the Data Management Systems Facility (DMSF). The functions of the old NSSDC are located within the CDSF, which is primarily responsible for the NSSDC interface to the scientific community and for NSSDC operations. The DMSF, formerly the Information Management Branch of the Applications Directorate, has and will develop systems supporting NSSDC objectives to improve data accessibility and use.

Because of advances in data management and because of internal changes in NSSDC, the nature of NSSDC documents is changing. They must now include information about on-line sources of information. To that purpose, documents from the DMSF have been added to the growing list of publications available from NSSDC. Principal off-line sources of information about NSSDC data sets are now contained within the *Data Catalog Series* (four volumes of this eleven-volume series are now available) and within the *NSSDC Data Listing*.

Further information on the activities and operations of NSSDC is included in the information pamphlet, *National Space Science Data Center*, which can be obtained by completing the order form at the end of this document. Currently in the revision process, an up-to-date form of this pamphlet will be available later this year.

World Data Center A for Rockets and Satellites

World Data Center A for Rockets and Satellites (WDC-A-R&S), operated in the United States by NASA under the auspices of the Geophysics Research Board of the U.S. National Academy of Sciences, is co-located with NSSDC. Because of this geographic proximity, the WDC-A subcenter can effectively cooperate with NSSDC in obtaining reduced and analyzed data to satisfy requests from scientists outside the United States.

WDC-A-R&S periodically prepares and distributes summaries and reports. The publications contain up-to-date listings of information on rockets and satellites, based on launching reports received during the publication period. The publications are distributed to scientists, institutions, other WDC subcenters, and to the Committee on Space Research (COSPAR). Information on the history, scope of operation, and services available through this WDC-A subcenter is documented in the information pamphlet, *World Data Center A*. This pamphlet can be obtained by completing the order form at the end of this document.

NATIONAL SPACE SCIENCE DATA CENTER

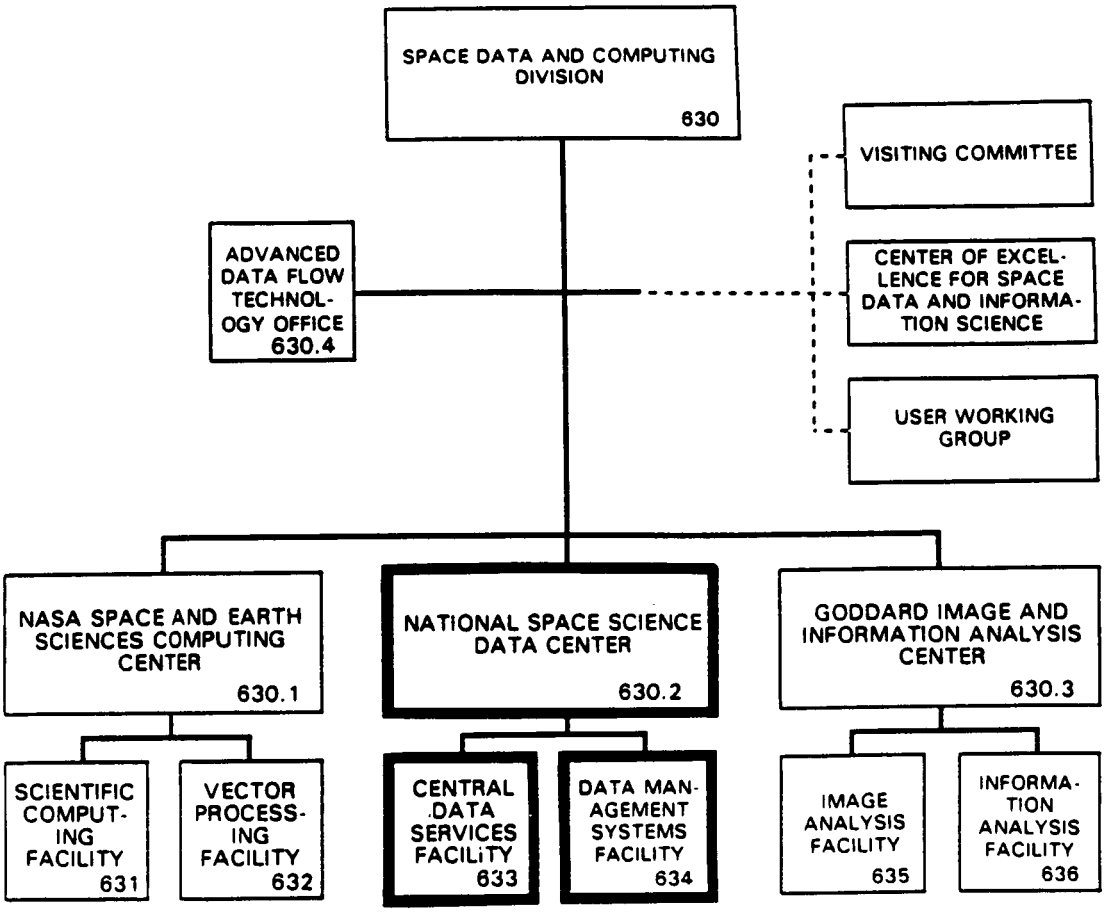

Figure 1. A detail from the Goddard Space Flight Center organizational chart.

Document Categories

Documents currently available from NSSDC represent the restructured character of the organization. NSSDC documents now include those generated by two branches within NSSDC: the Central Data Services Facility and the Data Management Systems Facility. The Central Data Services Facility, which assimilated the functions of the original NSSDC, continues to generate documents about satellites and about data from satellite experiments. The Data Management Systems Facility is contributing its own stock of documents about data systems and about data management research efforts. Documents from both facilities are described below.

In addition to documents containing general information about the operation of NSSDC and WDC-A-R&S, NSSDC publishes documents in two other major categories: (1) documents describing data management systems, which are generated by the Data Management Services Facility (GSFC Code 634); and (2) documents describing data about satellites and about experiment data from satellites, which are generated by the Central Data Services Facility (GSFC Code 633).

Document Availability and Ordering Procedures

NSSDC will provide, without charge, single copies of documents identified in this publication or provide automatic distribution services for selected categories of documents upon request from individuals who require the publications for scientific or educational use and who are affiliated with organizations of the following types located in the United States:

- NASA installations, NASA contractors, or NASA grantees
- Other U.S. Government agencies, their contractors, or grantees
- Universities or colleges
- State or local governments
- Nonprofit organizations

These same services are available to similar types of organizations outside the United States through WDC-A-R&S.

Anyone who meets the criteria specified above and who wishes to obtain a copy of a document or to be placed on a mailing list to routinely receive a particular category of document should specify why the document is needed, the subject of the work, the name of the organization with which the requester is affiliated, and any Government contracts which require him or her to have access to this information. Individuals who do not meet the criteria specified above may obtain copies of documents at cost from the following address:

National Technical Information Service
U.S. Department of Commerce
P.O. Box 1553
Springfield, Virginia 22151
U.S.A.

A user may obtain documents in any of the following ways:

1. Letter request
2. Document Request Form (included at the end of this document)
3. Telephone request
4. On-site request
5. Telex
6. Networks

Users who reside in the United States should direct requests for documents to the following:

National Space Science Data Center
Code 633.4
Goddard Space Flight Center
Greenbelt, Maryland 20771
Telephone: (301) 344-6695
Telex No.: 89675 NASCOM GBLT
TWX No.: 7108289716
SPAN Address: NSSDC::REQUEST

Users who reside outside the United States should direct requests for documents to the following:

World Data Center A for Rockets and Satellites
Code 630.2
Goddard Space Flight Center
Greenbelt, Maryland 20771
Telephone: (301) 344-6695
Telex No.: 89675 NASCOM GBLT
TWX No.: 7108289716
SPAN Address: NSSDC::REQUEST

When ordering individual documents, or when requesting to be placed onto a mailing list for a particular document category, the user must provide the general information requested in the preceding paragraph on document availability. In addition, the user must identify each of the documents by order number and title as given in the attached list of documents. The Document Request Form at the end of this document is intended to serve as a convenient mechanism for users to order documents described herein. When orders are received for documents that have been superseded or supplemented by later issuances, the user will be provided with the latest issue including any supplements.

DOCUMENTS DESCRIBING THE OPERATION OF NSSDC AND WDC-A-R&S

These documents, written on an unscheduled basis, contain general information about NSSDC and WDC-A-R&S, such as functions, operating procedures, activities, history, and services. They are available through standard ordering procedures.

DOCUMENTS DESCRIBING SATELLITES AND SATELLITE EXPERIMENT DATA

Documents Describing the Availability of Satellite Experiment Data

These documents announce the availability of data at NSSDC/WDC-A-R&S and aid the user in the selection of data and in the use of selected data. They may take one of several forms: (1) Catalogs describe the data that are available at NSSDC/WDC-A-R&S in a particular discipline, (2) Data Announcement Bulletins inform the scientific community of data that have become available since the last applicable catalog was published, (3) Data Users Notes provide substantial specific information about the data obtained from an experiment and aid in the selection of data for study, and (4) the annual *NSSDC Data Listing* provides a convenient abbreviated reference to space science and supportive data available from NSSDC. In certain cases, the catalogs go beyond describing the experiments and data sets covered by including summaries of mission characteristics and objectives.

These documents, written on an unscheduled basis, contain general information about NSSDC and WDC-A-R&S, such as functions, operating procedures, activities, history, and services. They are available through standard ordering procedures.

Report on Active and Planned Spacecraft and Experiments

This biannual report provides information on space measurements currently being made or those being planned in a broad range of scientific disciplines. By providing descriptions of the spacecraft and experiments, as well as approximate time periods when data are being accumulated, it is hoped that this document will be useful to people interested in the scientific, applied, and operational uses of such data. Furthermore, for persons planning or coordinating observational programs employing different techniques such as rockets, balloons, airplanes, ships, and buoys, this document can provide insight into contributions that may be provided by orbiting instruments.

The report contains summaries of spacecraft and experiments investigating astronomy, earth sciences, meteorology, planetary sciences, geodesy and gravimetry, aeronomy, particles and fields, solar physics, life sciences, and material sciences.

Specifically not included in the report are navigational and communications satellites or passive satellites still actively tracked by optical or laser methods for geodetic or atmospheric drag studies,

spacecraft having only continuous radio beacons used for ionospheric studies, classified spacecraft or experiments, and certain planned spacecraft or continuing series for which no information except the names is known. Updates, which are made biannually, are available through standard ordering procedures.

Data Catalog Series

This catalog series, which will consist of eleven volumes when completed, will describe (1) the holdings from all spacecraft flight investigations for which NSSDC possesses data or can direct people to the data source, (2) all data sets held by NSSDC, (3) some of the data sets held and serviced by NASA-funded investigators, and (4) some of the data sets held and serviced by foreign investigators. The series will serve as pointer documents for extensive data sets held and serviced by other Government agencies, particularly the National Oceanographic and Atmosphere Administration (NOAA).

The series consists of (1) five volumes that describe the spacecraft and their associated investigations separated into various categories, (2) five corresponding volumes that describe the various orbital information and investigation data sets, and (3) a master index volume.

To date, the first volumes of this series have been completed with the exception of the catalog descriptive of astronomy, astrophysics, and solar physics, which is now in progress. The corresponding volumes describing data sets are now in progress and Volume 3B (Descriptions of Data Sets from Low- and Medium-Altitude Scientific Spacecraft Investigations) will soon be in printing. An older series of catalogs describing types of satellite data acquired by NSSDC is still available. See "List of Documents Currently Available" at the end of this document.

The five categories of spacecraft that are used in the Data Catalog Series are described below:

(1) Planetary and Heliocentric. This category includes probes to the various planets of the solar system and probes designed to make measurements of the characteristics of interplanetary space. Also included are the probes which will pass out of the solar system into interstellar space.

(2) Geostationary and High-Altitude Scientific. This category includes those satellites designed to conduct investigations of the characteristics of near-earth space from orbits with apogees near geostationary altitude and higher. Three of the spacecraft are selenocentric. Communications satellites are not included because NSSDC does not archive such data.

(3) Low- and Medium-Altitude Scientific. Included are those spacecraft whose apogees are well below geostationary altitude and whose primary purpose is to conduct investigations in the near-earth environment.

(4) Meteorological and Terrestrial Applications. Included are geocentric spacecraft whose primary mission is to make remote sensing measurements of the earth and its atmosphere. Also included are spacecraft which carry instrumentation to make geodesy and gravimetry measurements. Technology, engineering, and communications spacecraft or investigations are not included because NSSDC does not archive such data.

(5) Astronomy, Astrophysics, and Solar Physics. This category consists of scientific satellites designed to conduct investigations of the sun, stellar objects, nonstellar sources, and interstellar phenomena. These satellites are geocentric except for the selenocentric RAE-B.

It is impossible to provide an organization of categories that separates the investigations cleanly into scientific disciplines, since many missions were multidisciplinary. With the above organization, which is partly discipline-oriented and partly orbit-oriented, it was found that in nearly all cases a given spacecraft belonged clearly to only one of the above five categories. The few exceptions encountered have resulted in some data sets appearing in more than one data set volume.

Each volume is organized in a way that is believed to be most useful to the user, and the organization for each volume is described in the "Organization Section" of that volume. For the standard types of orbital information, given in the data set catalogs, i.e., predicted, refined, and definitive, the information will be given in a tabular form to avoid repeating the same brief description an inordinate number of times. Since the wide variety of instruments precludes using a tabular format in most cases, the standard description of a data set from an investigation is a free text brief description. These catalogs are available through standard ordering procedures.

Handbook of Correlative Data

This 1971 document informs scientists of the availability of data potentially useful as correlative data in space science studies. The handbook acquaints the user with many geophysical phenomena and points the reader to more detailed discussions of the phenomena. It describes the nonsatellite data available from NSSDC and other facilities.

The handbook contains six major discipline-oriented parts covering galactic cosmic rays, solar electromagnetic radiation, energetic solar protons, geomagnetism, the ionosphere, and the neutral atmosphere. A miscellaneous data section covers magnetospherically trapped particles, solar wind, airglow, aurora, calendar records, activity charts, and Jovian radio emission. Each section includes a brief description of the phenomenon, reference to more extensive discussions of the phenomenon, reference to a discussion of measurement techniques, a brief discussion of available data, the time periods for which data exist, the medium in which data are stored, sources of more extensive

data availability listings, and sources from which the actual data can be obtained. It should be noted that this handbook is rather dated, and there are no current plans to update it. However, more recent data are available through the National Geophysical and Solar-Terrestrial Data Center and the World Data Center A for Solar-Terrestrial Physics, both located in Boulder, Colorado.

Spacecraft Program Bibliographies and Summaries

The bibliographies serve as a consolidated reference source for information on specific spacecraft programs such as the Orbiting Geophysical Observatory (OGO) and the Interplanetary Monitoring Platform (IMP) series.

The bibliographies include information pertinent to major accomplishments of the program, descriptions of the spacecraft (physical characteristics, orbit parameters, etc.) and spacecraft experiments, and references to the published scientific and technical papers, articles, and other documents covering instrumentation experiment results, spacecraft missions, etc. Copies of articles and reports referenced in the bibliographies are available at many scientific and technical libraries. If not, they can be obtained from the author or ordered through document distribution centers such as NASA's Scientific and Technical Information Facility (STIF), National Technical Information Service (NTIS), and the American Institute for Aeronautics and Astronautics (AIAA). Document accession numbers are given in the bibliographic descriptions, when available, to aid in obtaining copies from the appropriate document distribution centers. Program summaries contain similar bibliographic information but also contain descriptions of the major scientific contributions made by analyzing data collected during the spacecraft program.

Either supplements to the bibliographies and summaries or new cumulative editions are compiled as needed. These documents are available through standard ordering procedures.

Reports on Models of the Near-Earth Environment

Models and data composites of the particle and field environments of near-earth space have been constructed at NSSDC since the middle 1960's. These include models of the geomagnetically trapped energetic charged particles, magnetic field models, and solar proton event models.

The recent proton and electron models provide particle flux above several energies as functions of B and L. These models have been documented in a series of NSSDC documents issued since 1972. Besides describing the models and their derivation, these documents describe how the models can be incorporated in a machine-sensible way to allow the user to calculate the flux that can be expected to be encountered on a given space mission. They also describe the data used in the development of the models and some restrictions or limitations with which the user should be familiar. They are intended to provide an

understanding of the models and their uses to all users, from those interested in scientific uses, and the comparison of the data used in the models, to those interested only in the engineering applications.

Models have been developed for use in predicting particle fluences in the near-earth environment produced by solar storms. These are statistical models that allow one to estimate the probability that a specified fluence will be exceeded in a mission of given duration. A model to include geomagnetic shielding has been produced. A computer code to evaluate these model probabilities has been produced. A computer code to evaluate these model probabilities has been developed.

Models of the magnetic field in the vicinity of the earth have been generated and put into machine-sensible form. Both internally and externally produced fields have been modeled. The internal fields have been modeled largely through Legendre polynomial expansions. External fields have taken both empirical and semi-empirical forms.

Data composites of the interplanetary medium have been prepared. These represent data-based averages, usually hourly averages, of the interplanetary magnetic field and plasma observations. The time span presently covered is 1963-1985.

World Data Center A for Rockets and Satellites (WDC-A-R&S) Launch Summaries

These documents are a summary of satellite and rocket launching information received by WDC-A-R&S. They replace the WDC-A-R&S Catalogues of Data, which contained the same kinds of information, and the Sounding Rocket Launching Reports (SRL), which are no longer published. The launch summaries are divided into two parts:

- SOUNDING ROCKETS - This part contains a summary listing of successful scientific sounding rocket launchings identified during the report period and a listing of the names and addresses of scientists and institutions conducting scientific experiments using these sounding rockets. The listing of sounding rocket launchings presents information such as launch date and time, agency rocket designation, sponsoring country, launch site, experiment discipline, apogee, and principal experimenter. Also included in this part of the summary is information concerning the availability of meteorological sounding rocket data and a table of rocket launch sites giving the site name and location in geographic and geomagnetic coordinates.

- ARTIFICIAL EARTH SATELLITES AND SPACE PROBES - This part contains a summary listing of spacecraft successfully launched during the report period. The listing is chronologically ordered by spacecraft launch date. The spacecraft popular name, its official Committee for Space Research (COSPAR) international designation, the spacecraft sponsoring country,

the launch date, and the initial spacecraft orbit parameters (epoch date, apoapsis, periapsis, period, and inclination) are included for each spacecraft listed.

Launch summaries are usually prepared once a year. Cumulative launch summaries are published every 5 years.

SPACEWARN Bulletin

The SPACEWARN system is an international mechanism for the rapid distribution of information on satellites (spacecraft) and space probes. This system is managed for COSPAR by the International Ursigram and World Days Service (IUWDS), a permanent service of the Union Radio Scientifique International (URSI) in association with the International Astronomical Union (IAU), the International Union of Geodesy and Geophysics (IUGG), and with close liaison with other International Council of Scientific Unions (ICSU) bodies. The IUWDS World Warning Agency for Satellites, which is operated by WDC-A-R&S, provides, on behalf of COSPAR, the international designation for each launching of a spacecraft or space probe and issues the *SPACEWARN Bulletin.*

These bulletins serve as one mechanism for the distribution of satellite and space probe information. The material they contain is consistent with the *COSPAR Guide to Rocket and Satellite Information and Data Exchange* and various COSPAR resolutions; additional details may be found in the *COSPAR Information Bulletin* and other COSPAR reports.

The *SPACEWARN Bulletin* consists of the following four sections:

- A list of recent spacecraft launchings identifying their official international designations
- Texts of satellite and space probe launch announcements received by IUWDS World Warning Agency for Satellites during the previous month, identifying spacecraft name, launch date and time, initial orbit characteristics, and a statement of the mission objectives
- Listings of spacecraft particularly suited for international participation such as: (1) spacecraft with essentially continuous radio beacons on frequencies less than 150 MHz, or higher frequencies if especially suited for ionospheric or geodetic studies; (2) spacecraft that provide telemetered information on a continuing basis; (3) optical objects used for geophysical studies; and (4) satellites useful for simultaneous observation programs with small cameras
- Launching reports, as available, including prelaunch and postlaunch information pertaining to project and experiment officials, spacecraft and experiment mission objectives and instrumentation, spacecraft configuration, etc.

The *SPACEWARN Bulletin* is published monthly. It is issued to COSPAR National Contacts for satellite information, Satellite Regional Warning Centers, and various leaders and participants in COSPAR activities. Individuals can be added to the mailing list only with concurrence from their National SPACEWARN Representative. For further information, write to the following address:

IUWDS World Warning Agency for Satellites
Code 630.2
Goddard Space Flight Center
Greenbelt, Maryland 20771
U.S.A.

Documents from The International Magnetospheric Study/Satellite Situation Center (IMS/SSC)

The International Magnetospheric Study (IMS) was a concerted effort by nearly 50 countries to acquire and study ground-based, balloon, rocket, aircraft, and satellite data needed to improve our understanding of the plasma environment of the earth. An intensive data acquisition phase of the IMS was conducted from 1976 through 1979 and was followed by a data analysis phase for the period 1980 through 1985.

The IMS/Satellite Situation Center (SSC), operated by NSSDC/WDC-A-R&S, produced periodic reports that provided concise and easily used descriptions of the orbital positions of a number of satellites capable of making magnetospheric measurements during special periods. Also available is the *IMS Directory of Spacecraft and Experiment Scientific Contacts* which contains a Spacecraft Section and an Experimenter/Scientific Contacts Section.

Although the data acquisition phase of the IMS is over, some services of the IMS/SSC continue under the name of the Satellite Situation Center (SSC). These services include the prediction of various multi-satellite configurations in the magnetosphere and in the interplanetary medium. Details of these services may be obtained from NSSDC/WDC-A-R&S.

Catalogs from The Data Analysis Workshop Center

The Data Analysis Workshop Center (DAWOC) was developed to support the data analysis phase of the IMS, but it is also providing support to other areas of space science. This center conducts a series of Coordinated Data Analysis Workshops (CDAW) in which computer-accessible databases play a central role. The operational philosophy and the experience gained from the first workshop (CDAW 1.0) are described in *An Evolutionary Approach to the Group Analysis of Global Geophysical Data*.

Each database is built around a specific problem using ground-based and satellite data supplied by various investigators. Accompanying each problem-oriented database is a Data Catalog describing the data

sets, parameters, and other supporting information. As successive workshops are held on a given problem, the corresponding database and Data Catalog are updated. Currently, six Data Catalogs are available for CDAWs 1.0, 2.1, 3.0, 4.0, 6.3 and 7.0. Additional Data Catalogs will become available as new databases are generated.

Astronomical Data Center Documents

The Astronomical Data Center collects, creates and maintains catalogs of astronomy-related data for the purpose of disseminating requested material to the astronomical community. Through a cooperative agreement with the Centre de Donnees Stellaires in Strasbourg, France, all catalogs received by each institution are supplied to the other so that both locations have complete libraries. Data are also exchanged with astronomical data centers in Japan and the USSR. The Astronomical Data Center publishes an intermittent bulletin containing progress reports on topics related to astronomical data, plus a status report on catalogs currently available.

NSSDC Newsletter

The objectives of this quarterly publication are to inform the NSSDC user community and to expand that community. Regular columns and special features are intended to acquaint the reader with various data analysis systems at NSSDC, computer facilities and services, popular and new data acquisitions, and major scientific satellite systems.

DOCUMENTS DESCRIBING DATA MANAGEMENT SYSTEMS

The Pilot Climate Data System Brochure

The Pilot Climate Data System (PCDS) brochure provides a high-level description of an interactive, scientific information management system for locating, obtaining, manipulating, and displaying climate-research data. This system is easily accessed by those who have an account on the NSSDC computer. The brochure lists the currently supported data sets and describes the capabilities of the system. Potential users of the system may find this document useful.

The Pilot Climate Data System Catalog

The NASA Climate Data Catalog provides a summary of the technical information available in the Pilot Climate Data System's (PCDS) on-line catalog. The on-line catalog describes selected climate parameter data sets and the associated sensor measurements from which they were derived. The PCDS is an interactive, scientific management system for locating, obtaining, manipulating, and displaying climate-research data; and it maintains data set information in a machine-readable representation which can easily be accessed by those who have an account on the NSSDC computer.

The first section of this document discusses the purposes of the on-line catalog and describes the catalog format and content. The next section provides summarized information about each of the data sets currently described in the PCDS. The last two sections provide samples of the detailed descriptions available on-line for individual data sets or families of related data sets. One sample describes a climate parameter data set; the other a corresponding instrument radiance measurement data set.

This document is periodically updated and expanded, particularly to describe new climate data sets supported by the PCDS. Plans call for reissuing it from time to time.

Advancements in Land Resource Data Management: Pilot Land Data System

(Abstract)

The Pilot Land Data System (PLDS) is a newly established proof-of-concept system managed by NASA's Goddard Space Flight Center to improve access, data processing, transfer and analysis of land-related data for NASA and NASA-sponsored land science researchers. The system will be distributed in nature utilizing existing resources and technologies where possible and will design and incorporate techniques and methodologies as needed to accomplish the overall goal which is to develop and implement a prototype, state-of-the-art data and information system to support research in the land-related sciences that will lead to a permanent research-oriented tool.

Advancements in Land Science Management: Pilot Land Data System
(Published as a Technical Memorandum)

(Abstract)

The Pilot Land Data System (PLDS) is a newly initiated proof-of-concept system managed by NASA's Goddard Space Flight Center to improve access, data processing, transfer and analysis of land-related data for NASA and NASA-sponsored land science researchers. A selected set of operational science projects was chosen to establish processing needs, analysis capabilities, communication requirements, and to provide overall system design requirements for an eventual operational system in the 1990's. This approach provides accurate and timely inputs from the users to ensure basic analysis requirements which then can be used to drive the system's functional and operational requirements. The system, which will be distributed in nature and limited in scale, will address the following:

- Data management that will establish a central directory and that will provide advanced data access and storage, browse and catalog capabilities, and a natural language interface. This capability will support the management of spatial data and other related data, along with value-added information management services for supporting land-related research.

- Communication capabilities that will allow the efficient, rapid transfer of data sets from one remote location to another, and interconnection with data bases and computers. These services include electronic mail, remote log-in, and file transfer.

- Land analysis software tools that will incorporate sensor calibration, radiometric and geometric correction. It will also provide advanced algorithms for spatial and textural analysis and modeling.

- System access capabilities that will address data format standardization and protocols. Such capabilities will also simplify access to central resources, provide for selected access to currently inaccessible processors and data, place tools for processing data directly under the management of the scientist, improve data display, and simplify user interaction with software.

- Special processes that will support the inclusion of hardware and software developed outside of PLDS as appropriate to a specific needed capability and that do not conflict with any specific existing technical development.

Artificial intelligence design concepts will be employed in the PLDS in order to develop a goal-oriented system that has value-added services that will allow the system to support the scientists in an intelligent manner. An intelligent PLDS will provide a very friendly interface for the user. Such an interface means that much of the knowledge that is presently required to operate a computer system will be unnecessary because communication between user and system will be done using human rather than computer languages.

To accomplish these things will require a close working relationship between land and information scientists to translate future research processing needs and information science capabilities. The ultimate purpose is to improve the quality of worldwide land-related research, and to integrate this system into an operational global research tool.

The Development of a Prototype Intelligent Interface for NASA's Scientific Database Systems

(Abstract)

The National Aeronautics and Space Administration (NASA) Goddard Space Flight Center (GSFC) has initiated an Intelligent Data Management (IDM) research effort. The development of an Intelligent User Interface (IUI) is one of the research tasks that is a component of this effort. The intent of IUI is to develop a very friendly user interface system that is based on expert systems and natural language processing

technologies. The purpose of such a system is to support the large number of potential scientific and engineering users that presently have need of space-related research and technical data but have little or no experience in query languages or understanding of the information content or architecture of the databases of interest.

This technical memorandum discusses the design concepts, development approach and evaluation of performance of a prototype intelligent user interface system for the Crustal Dynamics Project database CRUDDES (CRUstal Dynamics Expert System). The Crustal Dynamics Project was developed and is managed at GSFC. CRUDDES was developed using a microcomputer-based expert system tool that supports backward chaining. The intelligent user interface design is based on a multiple view concept where the view used during a consultation is based on the area of expertise of interest and what kind of information is required by the user such as architecture and database organization information. Presently the knowledge base has more than three hundred rules and represents two user application views and an architectural view. Operational performance using CRUDDES has allowed non-database users to formulate queries based only on limited data that until now would require an expert database user or the database designer.

Crustal Dynamics Data Information System User's Guide (GSFC, October 1982, X-931-82-14)

(The background information which is given immediately below on the Crustal Dynamics Data Information System is provided for the purpose of introducing users to the system.)

The Crustal Dynamics Project was formed by NASA to apply space methods and technology to advance the scientific understanding of Earth dynamics, tectonophysics, and earthquake mechanisms. This project is responsible for applying space technology to the design and development of systems for making precise geodetic measurements that are useful for studying crustal movements and deformation, planning a measurement strategy to organize and collect the measurements, carrying out the measurement program, and supporting the analysis and interpretation of these measurements by selected teams of investigators.

The collection of the project-generated data sets over the past 10 years and through the lifetime of the project (1976 through 1990) required the establishment of a Crustal Dynamics Data Information System (DIS) which provides detailed on-line information about all acquired geodetic data. The collection of the various types of data includes a large amount of pre-processed laser and very long baseline interferometry (VLBI) data acquired at fixed and mobile stations located throughout the world.

Analyzed data products, received from project science support teams and project investigators, are made available from these laser and VLBI observations. These products include baseline lengths, station position data, polar motion data, and length-of-the-day data. Relevant

comments on the derivation of these results can be obtained through the DIS HELP facility. In addition, other related ancillary data products such as a priori station coordinate, calibration data, and site occupation information are accessible through the DIS.

The DIS is accessible to Crustal Dynamics Investigators by means of two dial-up telephone lines connected to 300 or 1200 baud modems. The menu-driven system and its user-friendly language allow for easy retrieval of any information contained in the DIS. The majority of the data stored in the DIS may be accessed through the ORACLE relational data base management system.

Documents

In addition to the user's guide cited above, typical DIS queries are available. For further information, contact Mr. Henry G. Linder, Data Manager, Crustal Dynamics Project, Code 601, Goddard Space Flight Center, Greenbelt, Maryland 20771.

LIST OF DOCUMENTS CURRENTLY AVAILABLE*
(April 1986)

NSSDC Order Number	Publication Title
DOCUMENTS DESCRIBING THE OPERATION OF NSSDC AND WDC-A-R&S	
NSSDC 70-19	National Space Science Data Center Brochure
ST 78-16	World Data Center-A Brochure
NSSDC/WDC-A-R&S 84-19	Guidelines for Submitting Data to the National Space Science Data Center
NSSDC/WDC-A-R&S 86-02	NSSDC and WDC-A-R&S Document Availability and Distribution Services
General Information	
NSSDC/WDC-A-R&S 81-06	Lunar Maps Available from NSSDC
NSSDC/WDC-A-R&S 81-10	Report on Active and Planned Spacecraft and Experiments (September 1981)
NSSDC/WDC-A-R&S 83-08	Report on Active and Planned Spacecraft and Experiments (September 1983)
NSSDC/WDC-A-R&S 85-01	Report on Active and Planned Spacecraft and Experiments (February 1985)
NSSDC/WDC-A-R&S 85-05	NSSDC Data Listing (July 1985)
	NSSDC Newsletter (a quarterly publication)
DOCUMENTS DESCRIBING DATA MANAGEMENT SYSTEMS	
	The Pilot Climate Data System Brochure
	The Pilot Climate Data System Catalog
	Advancements in Land Resource Data Management: Pilot Land Data System
	Advancements in Land Science Management: Pilot Land Data System
	The Development of a Prototype Intelligent Interface for NASA's Scientific Database Systems
GSFC X-931-82-14	Crustal Dynamics Data Information System User's Guide

*This list contains documents which are available as hardcopy and which will be provided as hardcopy until the supply is depleted; then they will be provided on microfiche. Earlier editions of documents, such as *NSSDC Data Listing* and *Report on Active and Planned Spacecraft and Experiments*, which are not listed, are available on microfiche. The dagger symbol (†) following a listed document title signifies that the document is now provided on microfiche.

DOCUMENTS DESCRIBING THE AVAILABILITY OF EXPERIMENT DATA

Astronomy

NSSDC 74-15c	Data Catalog of Satellite Experiments - Astronomy and Solar Physics†
NSSDC/WDC-A-R&S 78-05	Directory of Astronomical Data Files
NASA TM RP 1118	Catalog of Infrared Observations†
NSSDC/WDC-A-R&S 80-07	Astronomical Data Center Bulletin, Vol. 1, No. 1
NSSDC/WDC-A-R&S 81-09	Astronomical Data Center Bulletin, Vol. 1, No. 2
NSSDC/WDC-A-R&S 83-04	Astronomical Data Center Bulletin, Vol. 1, No. 3
NSSDC/WDC-A-R&S 82-01	Digest of Celestial X-Ray Missions and Experiments
NSSDC/WDC-A-R&S 84-13	Data Announcement Bulletin: Availability of Infrared Astronomical Satellite (IRAS) Data Sets from NSSDC

Ionospheric Physics

NSSDC 74-15a	Data Catalog of Satellite Experiments: Ionospheric Physics, Meteorology, and Planetary Atmospheres
NSSDC 75-07	Catalog of Ionospheric and Atmospheric Data
NSSDC/WDC-A-R&S 80-03	Coordinated Ionospheric and Magnetospheric Observations from the ISIS 2 Satellite by the ISIS 2 Experimenters, Vol. 1, Optical Auroral Images and Related Direct Measurements
NSSDC/WDC-A-R&S 80-05	Coordinated Ionospheric and Magnetospheric Observations from the ISIS 2 Satellite by the ISIS 2 Experimenters, Vol. 3, High-Latitude Charged Particle, Magnetic Field and Ionospheric Plasma Observations During Northern Summer
NSSDC/WDC-A-R&S 80-09	Coordinated Ionospheric and Magnetospheric Observations from the ISIS 2 Satellite by the ISIS 2 Experimenters, Vol. 2, Auroral Optical Emissions, Magnetic Field Perturbations, and Plasma Characteristics, Measured Simultaneously on the Same Magnetic Field Line
NSSDC/WDC-A-R&S 81-01	Coordinated Ionospheric and Magnetospheric Observations from the ISIS 2 Satellite by the ISIS 2 Experimenters, Vol. 4, A. Large Storms B. Airglow and Related Measurements C. VLF Observations

†This document, which is no longer available as hardcopy, is now provided on microfiche.

DOCUMENTS DESCRIBING THE AVAILABILITY OF EXPERIMENT DATA (Continued)

Meteorology and Remote Sensing

	The Nimbus 5 User's Guide
	The Nimbus 5 Data Catalog, Vols. 1-12†
	The Nimbus 6 User's Guide
	The Nimbus 6 Data Catalog, Vols. 1-12†
	The Nimbus 7 User's Guide
	Nimbus 7 Flight Evaluation Reports 1-4†
	The GOES/SMS User's Guide†
	Heat Capacity Mapping Mission (HCMM) User's Guide
	HCMM Information Packet (Data Catalog, Users Guide, Day/Night Image Catalog, Documentation)
	Magsat Information Packet
NSSDC 74-15a	Data Catalog of Satellite Experiments - Ionospheric Physics, Meteorology, and Planetary Atmospheres
NSSDC/WDC-A-R&S 82-25	Data Announcement Bulletin: Space Shuttle OSTA 1 Payload Data
	OSTA 1 Experiments
NSSDC/WDC-A-R&S 84-09	Data Announcement Bulletin: The SIR-A Movie

Particles and Fields

NSSDC 75-02	Catalog of Particles and Fields Data 1958-1965
NSSDC 75-03	Catalog of Particles and Fields Data 1966-1973
NSSDC/WDC-A-R&S 77-04	Interplanetary Medium Data Book
NSSDC/WDC-A-R&S 77-04a	Interplanetary Medium Data Book - Appendix
NSSDC/WDC-A-R&S 79-08	Interplanetary Medium Data Book, Supplement 1
NSSDC/WDC-A-R&S 83-01	Interplanetary Medium Data Book, Supplement 2
NSSDC/WDC-A-R&S 86-04	Interplanetary Medium Data Book, Supplement 3
NSSDC/WDC-A-R&S 82-28	Data Announcement Bulletin: Availability of IMP-J (IMP 8) Interplanetary Field and Plasma Data for the International Magnetospheric Study Period (IMS)

Planetary Atmospheres

NSSDC 74-15a	Data Catalog of Satellite Experiments - Ionospheric Physics, Meteorology, and Planetary Atmospheres
NSSDC 75-07	Catalog of Ionospheric and Atmospheric Data

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DOCUMENTS DESCRIBING THE AVAILABILITY OF EXPERIMENT DATA (Continued)

Planetology

NSSDC 74-15d	Data Catalog of Satellite Experiments - Planetology†
NSSDC 69-05	Lunar Orbiter Photographic Data Package†
NSSDC 76-02	Status of Availability of Lunar Orbiter TV Pictures
NSSDC 70-06	Apollo 11 Lunar Photographic Data Package†
NSSDC 70-09	Apollo 12 Lunar Photographic Data Package†
NSSDC 70-18	Apollo 13 Lunar Photographic Data Package†
NSSDC 71-16	Apollo 14 Lunar Photographic Data Package†
NSSDC 72-07	Apollo 15 Lunar Photographic Data Package†
NSSDC 73-01	Apollo 16 Lunar Photographic Data Package†
NSSDC 74-08	Apollo 17 Lunar Photographic Data Package†
NSSDC/WDC-A-R&S 77-02	Catalog of Lunar Mission Data
NSSDC/WDC-A-R&S 78-03	Lunar Transient Phenomena Catalog†
NSSDC 71-09	Mariner 6 and 7 Photographic Data†
NSSDC 73-03	Mariner 9 Data Announcement Bulletin†
NSSDC 74-05	Mariner 9 Data Announcement Bulletin Supplement†
JPL TM 33-595-VL1	Mariner Mars 71 TV Picture Catalog, Vol. 1
JPL TM 33-585-VL2	Mariner Mars 71 TV Picture Catalog, Vol. 2
JPL TM 33-595	Mariner 9 TV Picture Microfiche Library Users Guide
JPL TM 33-628	Users Guide to Mariner 9 TV RDR
JPL TM 33-723	Guide to User of Mariner Images
NSSDC 75-18	Status of Availability of Mariner 10 TV Pictures†
NSSDC 76-01	Zond 8 Lunar Photography Data Announcement Bulletin†
NSSDC/WDC-A-R&S 78-01	Catalog of Viking Mission Data
NASA RP-1007	Viking Lander Imaging Investigations
NSSDC/WDC-A-R&S 80-11	Apollo Seismological Investigations Data User's Note

Solar Physics

NSSDC 74-15c	Data Catalog of Satellite Experiments - Astronomy and Solar Physics†

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REPORTS ON MODELS OF THE NEAR-EARTH ENVIRONMENT

GSFC X-601-72-487	A Model of the Starfish Flux in the Inner Radiation Zone†
JSR, 12, 2 Feb. '75	Energetic Solar Proton vs. Terrestrially Trapped Proton Fluxes for the Active Years 1977-1983†
JSR, 11, 6 June '74	Solar Proton Fluences for 1977-1983†
NASA SP-3024	Models of the Trapped Radiation Environment, Vol. VII: Long-Term Time Variations
NSSDC 72-06	The AE 4 Model of the Outer Radiation Zone Electron Environment
NSSDC 72-11	The Use of Inner Zone Electron Model AE †
NSSDC 72-12	ALLMAG, GDALMG, LINTRA: Computer Programs for Geomagnetic Field and Field-Line Calculations†
NSSDC 72-13	A Model Environment for Outer Zone Electrons†
NSSDC 72-14	Study of Mutual Consistency of IMP 4 Solar Proton Data
NSSDC 74-03	A Model of the Trapped Electron Population for Solar Minimum
NSSDC 75-11	SOLPRO: A Computer Code to Calculate Probabilistic Energetic Solar Proton Fluences†
NSSDC/WDC-A-R&S 76-04	AE 6: A Model Environment of Trapped Electrons for Solar Maximum
NSSDC/WDC-A-R&S 76-06	AP 8 Trapped Proton Environment for Solar Maximum and Solar Minimum
NSSDC/WDC-A-R&S 77-01	A Model of the Near-Earth Plasma Environment and Application to the ISEE-A and -B Orbit
NASA SP-3054	World Maps of Constant B, L, and Flux Constants†
NSSDC/WDC-A-R&S 79-01	SOFIP: A Short Orbital Flux Integration Program†
NSSDC/WDC-A-R&S 79-06	A Study of Inner Zone Electron Data and Their Comparison with Trapped Radiation Models
GSFC X-601-75-136	A Survey of Long-Term Interplanetary Magnetic Field Variations†
GSFC X-922-74-303	Computation of the IGRF I. Spherical Expansions†
GSFC X-645-72-301	Average Daily Variations in the Magnetic Field as Observed by ATS 5†

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ROCKET AND SATELLITE INFORMATION AND DATA EXCHANGE DOCUMENTS

NSSDC/WDC-A-R&S 78-02	Launch Summary for 1973-77†
NSSDC/WDC-A-R&S 84-01	Launch Summary for 1978-1982
GSFC X-601-72-002	The National Space Science Data Center Guide to International Rocket Data†

IMS/SSC REPORTS AND OTHER ORBIT INFORMATION

IMS/SSC Report No. 9	IMS Directory of Spacecraft and Experiments Scientific Contacts - Final Update October 1980
GSFC X-692-70-64	Trajectories of Explorers 33, 34, and 35 July 1966-April 1969
GSFC X-692-73-291	Trajectories of Explorers 33, 35, 41, 43, and 47 May 1969 - December 1972
GSFC X-601-76-38	Trajectories of Explorers 43, 47, and 50 September 1972 - December 1975†
NSSDC/WDC-A-R&S 86-03	Trajectories of Pioneers 6-11, Helios A and B and Voyagers 1 and 2
Circular Letter Nr 7	CCOG Handbook for the IMS-GEOS (Period 1976-79)†
Circular Letter Nr 8	Supplement to the CCOG Handbook for the IMS-GEOS (Period 1976-79)

DATA ANALYSIS WORKSHOP CENTER (DAWOC)

NSSDC/WDC-A-R&S 79-02	An Evolutionary Approach to the Group Analysis of Global Geophysical Data
CDAW 1.0 Data Catalog	The IMS Events of December 1 1500h-December 2 2400h, 1977 and December 11 2100h-December 12 0730h, 1977
CDAW 2.1 Data Catalog	The IMS Events of July 28 1200h-July 29 2000h, 1977
CDAW 3.0 Data Catalog	ISEE 1 and ISEE 2 Bow Shock Crossings
CDAW 4.0 Data Catalog	ISEE 1 and ISEE 2 Magnetopause Crossings
CDAW 6.3 Data Catalog	An IMS Study: Energy Transfer in Near-Earth Space Associated with Substorms of March 22 and 31, 1979
CDAW 7.0 Data Catalog	The Response of the Magnetotail to Substorm Expansive Phase Activity

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LIST OF DOCUMENTS CURRENTLY AVAILABLE (Continued)

MISCELLANEOUS

NSSDC/WDC-A-R&S 81-04	Modeling the Data Systems Role of the Scientist (for the NEEDS Command and Control Task)†
NSSDC 71-05	Handbook of Correlative Data†
NASA SP 7601	OGO Program Summary
NSSDC 71-21	IMP Series Report/Bibliography†

DATA CATALOG SERIES FOR SPACE SCIENCE AND APPLICATIONS FLIGHT MISSIONS

NSSDC/WDC-A-R&S 82-21	Descriptions of Planetary and Heliocentric Spacecraft and Investigations (Volume 1A)
NSSDC/WDC-A-R&S 82-22	Descriptions of Geostationary and High-Altitude Scientific Spacecraft and Investigations (Volume 2A)
NSSDC/WDC-A-R&S 83-03	Descriptions of Low- and Medium-Altitude Scientific Spacecraft and Investigations (Volume 3A)
NSSDC/WDC-A-R&S 85-03	Descriptions of Meteorological and Terrestrial Applications Spacecraft and Investigations (Volume 4A)
NSSDC/WDC-A-R&S 86-01	Descriptions of Data Sets from Low- and Medium-Altitude Scientific Spacecraft and Investigations (Volume 3B)

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